

# Improved Temperature Regulation of Process Water Systems for the APS Storage Ring\*

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## **Abstract**

Beam stability and operational reliability of critical mechanical systems are key performance issues for synchrotron accelerators. Stability is influenced by temperature fluctuations of the process water used for cooling and/or temperature conditioning storage ring components such as vacuum chambers, magnets, absorbers, masks, etc. Water systems for the APS storage ring were originally provided with a distributive control system capable of regulation to  $\pm 1.0^{\circ}\text{F}$ , as specified by facility design requirements. After several years of operation, a particular mode of component mortality indicated a need for upgrade of the temperature control system. The upgrade that was implemented was chosen for both improved component reliability and temperature stability (now on the order of  $\pm 0.2^{\circ}\text{F}$ ). The design employs a programmable logic controller (PLC) for temperature control that functions under supervision of the existing distributive control system. The human-machine interface (HMI) of the PLC system employs RSView32 software. The PLC system also interfaces with the EPICS accelerator control system to provide monitoring of temperature control parameters. Eventual supervision of the PLC system by EPICS is possible with this design. Important design features of this improved system are presented as well as the implementation plan to incorporate the upgrade such that accelerator operations would not be compromised.

**Keywords:** water, temperature, control, stability, reliability

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